S/N 98/1034

~~RAPIDLY~~ SELF - HEAT-CONDUCTIVE HEAT DISSIPATING MODULE

Background of the Invention

1. Field of the Invention

The present invention relates to a ~~rapidly~~ self - heat-conductive heat dissipating module, and particularly to a heat dissipating module which can transfer heat effectively from the CPU of a computer or a device which ~~dissipating~~ generates a large amount of heat. The present invention comprises a plurality of heatsinks which are overlapped, but which can be mechanically separated and have discontinuous ~~in~~ contact~~ing~~ interface and a plurality of heat convection super conductive tubes ~~containing~~ made from high temperature super conductor composites .

2. Description of Prior Art

The heat dissipating devices for central processing units (CPUs) of computers or high heat generating devices use heatsink devices with a plurality of metal fins to contact the heat sources, absorb heat and then transfer heat to the fins. Then heat-dissipating fans are used to blow cold air ~~for~~ to disper~~sing~~ se the heat.

The prior art is effective for heat from a small CPU, ~~while~~ but for a CPU ~~dissipating~~ generating a large amount of heat, it can ~~not~~ not operate effectively since the metal base of the heatsink, which contacts the heat source is spaced with the distal ends of the fins. Just by the way that heatsink base contacts the heat source (i.e. CPU), the heat from the base of the heatsink can not be transferred to the distal ends of the

fins, and the root portions of the fins and the distal ends absorb unequal amounts of heat. In other words, the portion near the root of the base of the heatsink absorbs more heat, and the distal ends of the fins absorb much less heat. As a result, the root is the only portion of the base of the heatsink used to dissipate heat. Therefore, the aforesaid conventional heat dissipating devices can not match the requirements of the newly developed CPUs with high operation speeds

Summary of the invention

Accordingly, the primary object of the present invention is to provide a ~~rapidly~~ self-heat-conductive heat dissipating module, wherein ~~a rapidly~~ self-heat-conductive heat dissipating module has two heatsinks, a lower heatsink and an upper heatsink, which are overlapped ~~with fins facing fins, but can be mechanically separated and are discontinuous in contacting interface~~. At least one heat convection super conductive tube containing ~~inside from a outside with a~~ ~~containing~~ a high temperature super conductor composite ~~are~~ is engaged with the two heatsinks. A heat dissipating fan blows air ~~to~~ across the two heatsinks ~~for~~ th increas~~ing~~ e the heat dissipating efficiency.

Another object of the present invention is to provide a ~~rapidly~~ self-heat-conductive heat dissipating module ~~wherein~~ with a plurality of ~~rapidly~~ self-heat-conductive heat dissipating modules having heatsinks which are overlapped, with fins facing ~~fins~~ the fins of The heatsinks are ~~not~~ mechanically separa~~ble~~ ted and never discontinuous ~~in~~ contact~~ing~~ interface ~~and~~ with a

plurality of heat convection super conductive tubes containing high temperature super conductor composite~~s can be assembled together and then heat dissipating fan is used to blow cold air. Therefore, the rapidly self-heat-conductive heat-dissipating module can dissipate rapidly and efficiently.~~

The heat convection super conductive tubes are made of bendable metal tubes (for example, copper, aluminum, etc.) containing high temperature super conductor composites such as yttrium barium copper oxide (YBCO) ~~superconductor material~~, thallium barium calcium copper oxide (TBCCO) ~~superconductor material~~, mercury barium calcium copper oxide (HBCCO) ~~superconductor material~~, bismuth strontium calcium copper oxide (BSCCO) ~~superconductor material~~, or other superconductor material, or other ~~rapid~~ heat conductive material. Two ends of the tube are closed ~~for~~ to prevent~~ing~~ the superconductor material from draining out of the tube. Therefore, the heat convection super conductive tube is formed by a~~foresaid~~ metal tube containing the superconductor material enclosed therein. The principle used is that when the molecules in the tube are heated, heat energy can be transferred by convection due to the rapid oscillation and large friction. Therefore, the heat can be transferred rapidly~~ and it is called as a heat convection super conductive tube.~~

Since the heat transfer time in the heat convection super conductive tube from a hot end to a cold end is very short, the temperature difference between the hot end and the cold end is very small~~ and~~ thus an optimum heat

transfer can be acquired. It ~~has been appreciated~~ that the speed of heat transfer is about five times ~~of~~ that of copper. Furthermore, ~~it~~ is quicker than general extruded aluminum ~~heat dissipating~~ heatsinks.

As the temperatures of hot end and cold end of heat convection super conductive tube ~~is~~ very close, the temperature of the base of lower heatsink, which engages ~~with~~ hot end of heat convection super conductive tube, is highest ~~in lower heatsink~~, ~~and~~ temperature of top face (base also) of upper heatsink, which engaged ~~with~~ cold end of heat convection super conductive tube is highest ~~in the upper heatsink~~. Therefore, temperature of contacting interface between lower heatsink and upper heatsink will be the lowest. ~~Upwards~~ From the contacting interface, temperature rises continuously ~~till~~ top face of upper heatsink. The direction of heat flow in upper heatsink is downward. If the structure ~~is~~ continuous ~~in~~ contacting intrface between lower heatsink and upper heatsink , the downward heat flow of upper heatsink will impair heat dissipating of lower heatsink , and heat dissipating of CPU will be impaired ~~finally~~. In the present invention, lower heatsink and upper heatsink are mechanically separated and discontinuous ~~in~~ contacting interface.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing.

Brief Description of the Drawings

Fig. 1 is an exploded perspective view of the ~~rapidly~~ self-heat-conductive heat dissipating module of the present invention having two heatsinks and a plurality of U- shaped heat convection super conductive tubes.

Fig.2 is a perspective view showing ~~that~~ the elements of Fig.1 ~~are~~ assembled ~~and~~ with a heat dissipating fan ~~is further~~ installed.

Fig.3 is an exploded perspective view of the ~~rapidly~~ self-heat-conductive heat dissipating module of the present invention, wherein fins of two heatsinks are alternat~~ively arranged~~ed, with a plurality of U-shaped heat convection super conductive tubes and a heat dissipating fan being used.

Fig.4 is a perspective view showing ~~that~~ the elements of Fig.3 ~~are~~ assembled.

Fig.5 is ~~the~~ an exploded perspective view of the present invention, wherein two double U-shaped heat convection super conductive tubes and two heatsinks are assembled.

Fig.6 is a perspective view showing ~~that~~ the elements of Fig. 5 ~~are~~ assembled.

Fig.7 is a perspective view showing ~~that, with each~~ a pair of with the heatsink sets being formed by two heatsinks, each two heatsink sets ~~are~~ assembled ~~together~~ into one composite ~~rapidly~~ self-heat-conductive heat dissipating module of the present invention.

Detailed Description of the Preferred Embodiments

Referring to **Fig.1**, the ~~rapidly~~ self-heat-conductive

heat dissipating module of the present invention ~~is illustrated. The heat-dissipating module~~ has a heatsink 1, a heatsink 2 and a plurality of heat convection super conductive tubes 3.

In the present invention, there are two heatsinks which are mechanically separated and discontinuous in structure.

Fig. 1 shows the first embodiment of the present invention. ~~There are heatsink 1 and heatsink 2.~~ Heatsink 1 has a plurality of fins 11 connected ~~on~~ to the base 10. Heatsink 2 has a plurality of fins 21 connected ~~on~~ to the base 20. Base 10 of heatsink 1 has a plurality of trenches 12, and base 20 of heatsink 2 (top face of upper heatsink) has a plurality of trenches 22. The heat convection super conductive tubes 3 are bent to have a U shape. Lower sections 31(hot ends) of the U-shaped tubes 3 are placed in trenches 12 , upper sections 32(cold ends) of the U-shaped tubes 3 are placed in another set of trenches 22. Heatsink 1 and heatsink 2 are assembled as one set. ~~Meanwhile,~~ the heat convection super conductive tubes 3 have the effect of buckling two heatsinks (referring to **Fig. 2**). The bottom of the base 10 of the heatsink 1 with lower sections 31 (hot ends) of the U-shaped tubes 3 serves ~~for~~ to contact~~ing~~ a heat source, such as a CPU. Therefore, a large amount of heat can be transferred to heatsink 2 through the heat convection super conductive tubes 3.

The reason for using two heatsinks that are mechanically separated and discontinuous ~~in~~ at the contact~~ing~~ interface is

that no convection between upper heatsink 1 and lower heatsink 2 occurs, since the upper heatsink 1 and lower heatsink 2 are separated, and thus no heat ~~returns~~ passes between them.

Since the heat transfer time in the heat convection super conductive tube from a hot end 31 to a cold end 32 is very short, the temperature ~~of~~ difference between the hot end 31 and the cold end 32 is very small. As the temperatures of the hot end 31 and the cold end 32 ~~is~~ are very close, the temperatures of the lower base 10 and the upper base 20 will be ~~the~~ highest, and the ~~the~~ temperature ~~of~~ at the contact~~ing~~ing face between heatsink 1 and heatsink 2 will be the lowest. From the contact~~ing~~ing face upward, temperature rises continuously ~~till~~ toward upper base 20, the direction of heat flow in heatsink 2 is downward. If the structure of the contact interface is continuous between heatsink 1 and heatsink 2, the downward heat flow of heatsink 2 will impair heat dissipating of heatsink 1, and the heat dissipating of the CPU overall will be impaired ~~finally~~. In the present invention, heatsink 1 and heatsink 2 ~~are~~ have mechanically separated and discontinuous ~~in~~ contact~~ing~~ interface. Therefore, a ~~rapidly~~ self-heat-conductive heat-dissipating module is formed by the heat convection super conductive tubes 3 containing high temperature super conductor composites, heatsink 1 and heatsink 2 ~~which are mechanically separated and discontinuous in structure.~~

A heat dissipating fan 4 is assembled at the ~~identical lateral~~ side of the two heatsinks ~~for~~ to blow~~ing~~ cold air to the fins 11 and the fins 21 to achieve a high efficiency heat dissipation.

Fig.3 shows ~~the~~ a second embodiment of the present invention ~~is illustrated~~. ~~There are~~ Heatsink 1 and heatsink 2, ~~which~~ are mechanically separated and discontinuous in structure. Base 10 of the heatsink 1 has a plurality of trenches 12, and base 20 of the heatsink 2 has a plurality of trenches 22. The heat convection super conductive tubes 3 are bent to have a U shape. ~~Two~~ The ends of the U-shape tubes are placed in trenches 12 and trenches 22.

Heatsink 1 and heatsink 2 are assembled as one set, and the fins of the two heatsinks are alternatively arranged. The alternatively arranged fins ~~can~~ increases the area of heat dissipation.

~~Meanwhile,~~ The heat convection super conductive tube 3 has the effect of buckling two heatsinks (referring to **Fig. 4**). The base 10 of the heatsink 1 with trenches 12 serves ~~for~~ to contact~~ing~~ a heat source. Therefore, a large amount of heat can be transferred to heatsink 2 through the heat convection super conductive tube 3. The heat is thus transferred to each heatsink. A heat dissipating fan 4 is assembled at the ~~identical lateral~~ side of the two heatsinks for blowing cold air to the fins 11 and fin 21 to achieve a high efficiency heat dissipation.

Fig.5 shows ~~the~~ a third embodiment of the present invention. In this ~~the present invention~~ embodiment, the heatsinks are identical to those in the first embodiment, which are mechanically separated and discontinuous in structure.

There is a difference between the heat convection super conductive tubes of **Fig.1** and **Fig.5**. In the third embodiment (Fig. 5), there ~~There~~ are two heat convection super conductive tubes 53 and 54. Both are

formed by two U shapes.

A first ~~One~~ heat convection super conductive tube 53 is wider than a second tube ~~and the other~~ 54 ~~is narrower~~. The two free ends 531, 532 of the double U shapes of the wider heat convection super conductive tube 53 ~~can be~~ are placed in the two trenches 121, 124. The ~~portions of double U shapes~~ inner 533, 534 of the wider heat convection super conductive tube 53 ~~having no free end 533, 534~~ are placed in the two trenches 221, 224.

The two free ends 541, 542 of the double U shapes of the narrower heat convection super conductive tube 54 are placed in the two trenches 122, 123 at the inner sides. The ~~portions of double U shapes~~ inner 543, 544 of the narrower heat convection super conductive tube 54 ~~having no free end 543, 544~~ are placed in the two trenches 222, 223 ~~at the inner sides~~.

Therefore, in addition to transferring through the fins 11, the heat absorbed by the base 10 can be transferred to the heatsink 2 through the heat convection super conductive tubes ~~rapidly~~.

Fig.6 shows a heat dissipating fan 4 ~~is~~ assembled at the ~~identical lateral~~ side of the two heatsinks 1,2 ~~for~~ to blow~~ing~~ cold air to the fins 11, 21 to achieve a highly efficient heat dissipation.

Fig.7 shows ~~the~~ a fourth embodiment of the present invention. In this embodiment, the heatsink sets 71,72 and the heat convection super conductive tubes 3 ~~can be~~ are assembled together.

The ~~rapidly~~ self-heat-conductive heat dissipating

module of the present invention has the following advantages:

1. Heatsinks of ~~rapidly~~ the self-heat-conductive heat dissipating module of the present invention are mechanically separated and discontinuous in structure, ~~and~~ so that heat ~~of heatsink contacting~~ from the heat generating device can dissipate more rapidly.
2. The adoption of heat convection super conductive tubes containing high temperature super conductor composites make heat ~~of heat generating device~~ dissipate more rapidly.
3. In the present invention, a plurality of ~~rapidly~~ self-heat-conductive heat dissipating modules can be assembled ~~integrally~~, the heat from the heat source ~~can~~ therefore dissipate ~~and~~ even more rapidly.
4. The alternatively arranged fins ~~make~~ increase the heat dissipating area ~~increase and heat disspate more rapidly~~.

The present invention ~~are thus~~ having been described, it will be obvious that modifications and variations may be easily made without departing from the spirit of this invention ~~which is defined by the appended claims~~. Such modifications and variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications and variations as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

ABSTRACT OF THE DISCLOSURE

A ~~rapidly~~ self-heat-conductive heat dissipating module ~~is disclosed including:~~ that includes a plurality of heatsinks which are overlapped, but are mechanically ~~separable~~ separated and discontinuous ~~in~~ at a contacting interface; at least one heat convection super conductive tube containing a high temperature superconductor composite; and at least one heat dissipating fan ~~assembled to an identical lateral side of the heatsinks. In addition to serving to buckle heatsinks together~~, connecting the heat convection ~~super conductive tubes containing high temperature superconductor composites transfer heat to~~ heatsink far away from heat generating source ~~rapidly, whereby efficiency of heat dissipating increases~~. Mechanical separation between buckled heatsinks and discontinuity in contacting interface between heatsinks ~~avoid~~ prevents heat dissipation by the heatsink ~~contacting heat source being impaired by the downward heat flow from heatsink far away from heat source~~. ~~Heat dissipating~~ fans ~~assembled to an identical lateral side of the heatsinks~~ blow cold air to fins of ~~heat~~heatsinks to increase ~~heat-dissipating efficiency~~ the fins of contacting heatsinks can be arranged alternatively to increase heat-dissipating efficiency. A plurality of heatsink sets can be assembled together to form a composite ~~rapidly~~ self-heat-conductive heat dissipating module ~~to further enhance heat-dissipating efficiency. All characteristics of the present invention mentioned above make rapidly self-heat-conductive heat-dissipating module of the present invention a~~

highly efficient heat-dissipating device.